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A BRIEF STUDY OF THE DURATION OF TUBERCULOSIS IN A GROUP OF ACUTELY FATAL CASES.

Thesis

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A BRIEF STUDY OF THE DURATION OF TUBERCULOSIS IN A GROUP OF ACUTELY FATAL CASES.

Estimates regarding the duration of life in tuberculosis patients have been very variable. Fishberg (I) states that different authors have estimated the average life of the consumptive at I to IO years, and that the reason for this great variation is the difficulty of obtaining comparable material.

In a recent comprehensive review of the literature on the subject of the duration of lung tuberculosis, Würtzen (2) discusses the various methods which have been used in the calculations, and notes that the two most valuable ones are: -

I. The determination of the length of life after contracting the disease, in a given series of patients, totalling the number of months, and dividing by the number of patients in the series.

2. The percentage estimate of the number of persons in a certain group of tuberculosis patients, who are alive or dead at the end of the first, second, third year, etc. This second method has been used in this country particularly in the study of the subsequent course of the disease in patients discharged from sanatoria. While very valuable for this purpose, it is obvious that many cases must be included in such a study, in which the tuberculosis itself was not fatal, but where death was due to some other cause. Omitting such studies,

therefore, the results cited by Würtzen may be tabulated as follows, for greater ease of comparison:-

Author	Source of Material	No. of Cases	Average Duration Both Sexes	Average Duration Men	Average Duration Women
Reiche 1902	Patients considered too far advanced for sanatorium treatment	683	43 mos.	-	-
Stadler 1893 1902	Cases from Marburg University Polyclinic working class people	670	3.2yrs.	3.5yrs.	2.2yrs.
Engelsted 1854	Postmortem data from General Hospital, Copenhagen	100	22½mos.	-	-
Carlsen 1896	Death certificates provincial towns	-	-	30mos.	29.3mos.
Salomonsen	"Danmark" Insurance Society data	142	24mos.	-	-
Gjör 1866	Patients dying in the municipal hospital Christiania	221	33.4mos.	35.4mos.	31.3mos.
Thue 1900- 1903	Christiania Hospital	194	31.4mos.	-	-

Author	Source of Material	No. of Cases	Average Duration Both Sexes	Average Duration Men	Average Duration Women
Norwegian Medical Society's Tuberculosis Commission 1891-1900	Joint investigation by doctors of Norway	1676	-	37mos.	38mos.
Wurtzen April 1906-through 1919	Tuberculosis Department of Deresund Hospital	1812 adults	35.9mos.	37.1mos.	34.4mos.
		87 children	11.9mos.		

All these investigations were limited to cases of pulmonary tuberculosis, and in the majority of them the course of the material is such that both chronic and acute cases are included. Moreover, in all but one group (Engelsted, 1854) none of the cases were checked up by autopsy records. It has been pointed out, however, by Dr. Pearl and Miss Bacon, in their paper on "The Quantitative Relations of Certain Viscera in Tuberculosis" (3), that in a considerable proportion of the cases in which tuberculosis was the only disease diagnosed while the patient was alive, autopsy findings disclosed other pathological conditions also present, sufficiently grave, in themselves, presumably to have caused death. They also showed that in the cases where

tuberculosis was present alone, death occurred at earlier ages than in the group where, although tuberculosis lesions existed, other lesions sufficient to have caused death were also present. This would indicate that where the tuberculosis itself was the sole cause of death, it was rapidly fatal, and death occurred sooner than in those cases where the tuberculosis was merely present as a complication of another serious disease.*

With the purpose of investigating this matter further, a study has been made of a group of cases which came to autopsy at the Johns Hopkins Hospital between the years 1889-1918, inclusive. Only those cases were used in which the autopsy findings showed that the only significant lesions were tuberculous, and there was no possibility that the tuberculosis might have been merely one of several factors contributing to death. Any form of tuberculosis was included, not merely pulmonary, although the cases where death was due to pulmonary tuberculosis constituted almost half of the group. It is important to note that it has been a definite policy of this hospital, as in many general hospitals where space is a problem of great importance, not to take in chronic cases of tuberculosis, in which the progress of the disease is so slow as to occupy years;

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* Note - In Engelsted's group of cases, although we do not know what the autopsy findings were, and he presumably did not limit himself to those cases where tuberculosis was the only disease found, yet it is noticeable that the average duration of the disease in this group of cases is shorter than in any of the others where no autopsy check was used.

if such cases are taken in for any reason, they are not likely to be kept until death, but are sent home or to a sanatorium. This limits the material still more definitely to acute, progressive cases. As the time was limited, only the group of colored females was considered, of whom 48 were found to fulfill the above conditions - namely, to have died of tuberculosis, without any other significant lesions being found at autopsy.

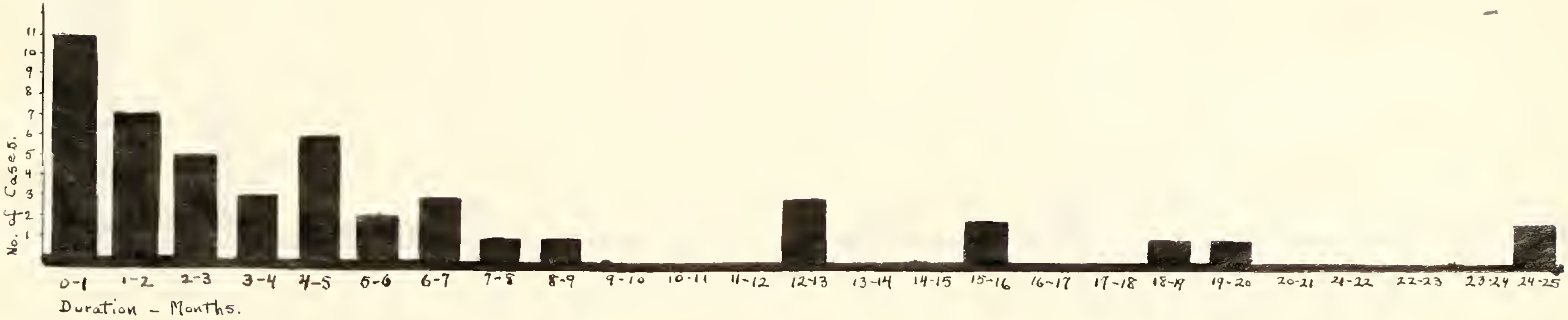
In going over the histories of these cases, the time of the appearance of the first symptom which could definitely be considered as pointing to tuberculosis was noted, and the duration of the disease from this time to death calculated. In a few cases, however, where there had been tuberculosis symptoms quite distinct from the process responsible for death, for example, cervical adenitis, followed by a period of apparent cure or arrest of the tuberculosis, these were ignored in the calculation of the statistical constants, and the first symptom of the process which eventually caused death was chosen as the beginning symptom. There were only 6 such cases and a note has been made in regard to each one in the table giving a summary of the cases.

The time between the definite diagnosis of tuberculosis and death was also noted. In most cases, of course, the date of diagnosis was approximately the same as that of admission to the hospital, as the patients were of a class who were not likely to consult a private physician, but

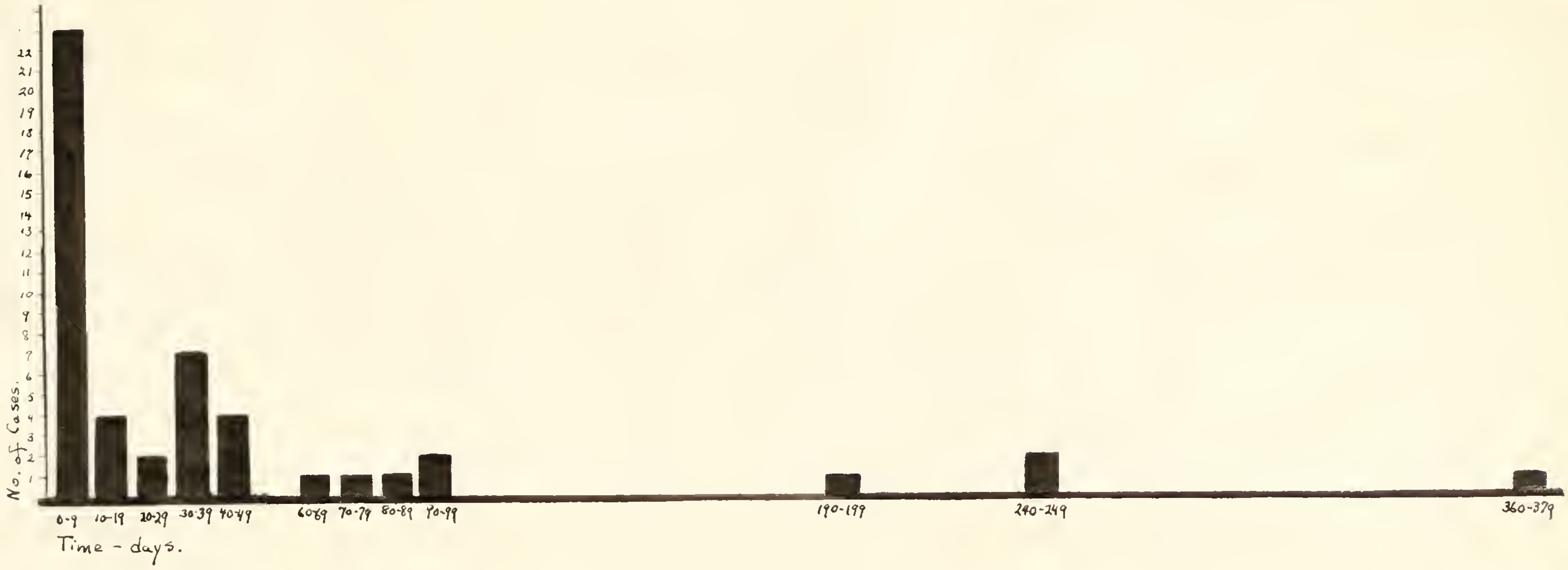
in a few cases, the diagnosis was not made until the patient had been in the hospital sometime, or was not made at all until autopsy.

The following tables show the distribution of the cases in respect to the conditions noted, and also the calculated statistical constants. Table I, gives a general summary of the cases, arranged in the order of the age of the patient at death. Table II, shows the distribution of the cases according to the duration of the disease after the appearance of the first symptom, and Table III, the distribution of the cases according to the time between the diagnosis of tuberculosis and death. The histograms on pages 7 and 8, gives a graphic representation of the material in tables II and III.

The striking thing shown by these tables is the short average duration of the illness between the time of the appearance of the first symptom and death (5.9 months), and the very short average time between the diagnosis of tuberculosis and death (43.96 days). It is necessary to remember, of course, that these patients are all colored, a race notoriously likely to ignore their symptoms, especially such symptoms as are characteristic of early tuberculosis - for instance, slight cough, increasing weakness, etc., in which the change from the normal may come on so gradually as not to be realized by persons



Histogram showing Duration of Cases from Appearance of First Symptom to Death.



Histogram Showing Distribution of Cases According to Time from Diagnosis to Death.

Table 1 - General Summary of Cases

Age at death	Predominant form of Tuberculosis	Time from first symptom to death	Time from diagnosis to death
(years)		(months)	(days)
37	Tbc.peritonitis	6	30
35	Tbc.meningitis	$2\frac{1}{2}$	35
33	Pulmonary tbc.	$3\frac{1}{2}$	45
31	" "	2	75
30	Tbc. of urinary tract	19	14
23	Tbc.peritonitis	2	21
23	Pulmonary tbc.	12	240
23	" "	$4\frac{1}{2}$	6
23	" "	5	60
22	" "	18	240
21	" "	8	49
20	" "	$7\frac{1}{2}$	15
20	Tbc.meningitis	$\frac{3}{4}$ (adenitis 11yrs. previously)	1
19	" "	$\frac{1}{2}$	4
19	Pulmonary tbc.	12	30
18	Tbc.peritonitis	1	2
17	Pulmonary tbc.	1	14
17	" "	15	45
17	" "	6	6
15	" "	12	39
15	Tbc. meningitis	$\frac{3}{4}$	2
14	" peritonitis	24	30
14	" of spine with transverse myelitis	$2\frac{1}{2}$	49
14	Miliary tbc.	2	35
13	Pulmonary tbc.	$4\frac{1}{2}$ (adenitis $3\frac{1}{2}$yrs. previously)	90
12	" "	$4\frac{1}{2}$	14
12	Tbc.meningitis	1/3	8
10	Pulmonary tbc.	15	365
$9\frac{1}{2}$	Tbc.meningitis	$1\frac{1}{4}$	9
8	" "	(adenitis 7 mo.)	
	" "	$\frac{3}{4}$	3
8	" "	$1\frac{3}{4}$	3
$7\frac{1}{2}$	" "	$\frac{1}{2}$	7
7	" "	1/6 (cough 4 mo.)	5
4 5/6	Pulmonary tbc.	6	6
4 $\frac{1}{2}$	Tbc.meningitis	2	7
3 5/6	" "	1/3	0
3 $\frac{3}{4}$	Pulmonary tbc.	$\frac{3}{4}$	0
3 $\frac{1}{2}$	Tbc.meningitis	$\frac{1}{4}$ (spinal tbc.$2\frac{1}{2}$ yrs.)	7
2 $\frac{3}{4}$	Pulmonary tbc.	4	35
2 2/3	Tbc. of crebellum	3	0
2	Tbc.meningitis	$\frac{1}{2}$	3
2	Pulmonary tbc.	$\frac{3}{4}$	0
$1\frac{3}{4}$	" "	4 (adenitis $6\frac{1}{2}$mos.)	28
$1\frac{1}{2}$	Tbc.meningitis	1	0
1	" "	4	90
5/6	" "	$1\frac{1}{2}$	3
$\frac{3}{4}$	Pulmonary tbc.	1	1
1/3	Miliary tbc.	1	3

Table II

Duration of Disease after appearance of first symptom

Duration - (months)	No. of Cases
Under 1	11
1-2	7
2-3	5
3-4	3
4-5	6
5-6	2
6-7	3
7-8	1
8-9	1
9-10	0
10-11	0
11-12	0
12-13	3
13-14	0
14-15	0
15-16	2
16-17	0
17-18	0
18-19	1
19-20	1
20-21	0
21-22	0
22-23	0
23-24	0
24-25	2
Total	48

Mean Duration = 5.88 ± .61 months

Standard Dev. = 6.29 ± .43 "

Coefficient of Variation = 112.66 ± 14.57%

Table III

Time from Diagnosis of Tuberculosis to Death.

Time - Days	No. of Cases
0 - 9	22
10 - 19	4
20 - 29	2
30 - 39	7
40 - 49	4
50 - 59	0
60 - 69	1
70 - 79	1
80 - 89	1
90 - 99	2
190 -199	1
240 -249	2
360 -369	1
Total	48

Mean Time = 43.96 ± 7.07 days

Standard Deviation = 72.6 ± 4.99 "

Coefficient of Variation = 165.15 ± 28.87 %

not given to close observation of their own condition. The same factor must be taken into account with regard to the diagnosis, as these people are likely to put off a visit to the hospital until their symptoms become so severe as actually to incapacitate them.

Even so, however, the important thing is, that in these fatal cases of tuberculosis, the course of the disease was rapid, and the condition was not diagnosed until so late that any arrest of the disease would have been impossible.

The fact that the standard deviation, both in the case of the duration of symptoms and in that of time from diagnosis to death, is greater than the mean, points, of course, to a wide scatter, or dispersion, of the cases. It is noticeable, however, that the cases thus widely scattered, ie. of considerably longer duration than the average, are very few in number. In regard to the occurrence of the first symptom, the cases of more than 8 months' duration are only 9 in number, or 18.75% of the whole 48. As for the time between diagnosis and death, the cases in which this is greater than 3 months (90 days) are only 4 in number, or 8.33% of the whole.

The cases examined fall automatically into two principal groups - those in which the most prominent feature of the tuberculosis process was the pulmonary involvement, and those in which tuberculosis meningitis played a leading role. There is naturally a good deal of overlapping in these two groups, as many of the cases with tuberculous meningitis also showed active pulmonary tuberculosis while an occasional case occurred in which, though meningeal symptoms appeared shortly before death, the most prominent part of the picture was the pulmonary tuberculosis.

If, however, the two groups are separated according to the dominant feature of the disease in each case, we find 22 cases which can be classed as pulmonary tuberculosis, and 17 as tuberculous meningitis, a few cases falling into neither of these groups, but including such heterogeneous forms as tuberculous peritonitis. tuberculosis of the urinary tract, etc. Considering only the two main groups, they are distributed as follows as to the duration of the disease from the time of the appearance of the first symptom, and as to the time from diagnosis to death: -

Table IV.

Pulmonary Tuberculosis

Time from first symptom to death (Months)	Time from Diagnosis to death. (Days)
¾	0
¾	0
1	1
1	6
3½	6
4	6
4	14
4	14
4½	15
4½	28
5	30
6	35
6	39
7½	45
8	45
12	49
12	60
12	75
15	90
15	240
18	240
24	360
7.66 Average	63.55 Average

Tuberculous Meningitis

Time from first symptom to death (days)	Time from Diagnosis to death (days)
5	0
7	0
10	1
10	2
17	3
17	3
18	3
21	3
21	4
24	5
28	7
30	7
35	7
42	8
49	9
70	35
120	90
30.82 Average	11.0 Average

It is noticeable here, that even when the cases of tuberculous meningitis, with their very short course, are eliminated, the average duration of the other, i.e., the cases of pulmonary tuberculosis, is surprisingly short - 7.66 months, with an average course following diagnosis of only 63.5 days.

A division of the cases according to the age of the patient shows a much more rapid course in the young children, which corresponds with the findings of Würtzen and others.

Table V

Course of the Disease at Various Ages.

Age groups	No. of cases	Average Time from first symptom to death (months)	Average Time from diagnosis to death
Under 5	15	2.26 mos.	12.2 days
5-9	5	1.67 "	5.4 "
10-14	7	7.47 "	44.3 "
15-19	8	6.04 "	17.7 "
20-29	8	7.22 "	4.13 mos.
30-39	6	11.0 "	1.14 "

In summary it may be said that this study, though based on a very small number of cases, is at least suggestive, in indicating the short course in these cases of acute fatal tuberculosis, in contrast with the longer average course found by most investigators where chronic cases were included in the

calculations and where the cases were not autopsied to make sure that death was actually due to the tuberculosis. The difference is too great to be accounted for merely by the race of the patients, and indicates that the course of acutely fatal tuberculosis is much shorter than has been generally supposed.

References

1. Fishberg, Maurice - "Pulmonary Tuberculosis" - London, Henry Kimpton, Pub. 1922.

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3. Pearl R. and Bacon,A.L. - "The Quantitative Relations of Certain Viscera in Tuberculosis" - No. I of "Biometric Studies in Pathology" - The Johns Hopkins Hospital Reports, vol XXI , Fasciculus III, Baltimore, The Johns Hopkins Press, 1922.